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PROBLEMS.

98. By Cadet E. S. Farrow, West Point, N. Y.—A stream of water moves at the rate of 9 miles an hour, with a fall of one foot per mile; what is the momentum of the water per square foot?

99. By Prof. J. Scheffer, College of St. James. — Two points are given. Without using a ruler—that is with a pair of dividers only—to determine two other points which, with the first two, form the four vertices of a square.

100. By Prof. A. B. Evans, Lockport, N. Y.—Three circles A, B, C are tangent externally, and within the space enclosed by this group, three other circles A_1, B_1, C_1 are inscribed tangent to one another and each tangent to two circles of the first group: the group A_x, B_x, C_x is similarly situated with respect to the group preceding it. If a, b, c and a_x, b_x, c_x be the radii of the circles in the first and $(x+1)$th groups' prove the following relations;

$$\frac{1}{a_x}+\frac{1}{a}=\frac{1}{b_x}+\frac{1}{b}=\frac{1}{c_x}+\frac{1}{c} \qquad \text{when } x \text{ is odd;}$$

and

$$\frac{1}{a_x}-\frac{1}{a}=\frac{1}{b_x}-\frac{1}{b}=\frac{1}{c_x}-\frac{1}{c} \qquad \text{when } x \text{ is even.}$$

101. By Prof. C. M. Woodward, St. Louis, Mo.—From any point O, within the circumference of a circle, two lines are drawn making a constant angle with each other. These lines revolve about O in the plane of the circle, and from the points where they cut the circumference tangents are drawn.. Find the locus of the intersection of these tangents.

102. By G. W. Hill. — Prove that in every triangle the square of the sum of the squares of the sides exceeds double the sum of their fourth powers.

103. Through two given points draw a circle bisecting the circumference of a given circle.

104. By Dr. A. B. Nelson, Danville, Ky.—Show that $x^3+1 = y^2$ is possible for the values $x = 0$, -1, and 1, only.

105. Show that in taking a handful of shot from a bag it is more probable that an odd number will be drawn than an even number.

106. By Christine Ladd, Union Springs, N. Y.—Interpret

$$\frac{\alpha\beta^2 - \beta\alpha^2}{V\alpha\beta}.$$